

## CLAIMS

1 - Process for synthesis of hydrocarbons by Fischer-Tropsch reaction starting from a synthesis gas, in a reaction zone (1) containing a reaction medium comprising the said synthesis gas and a catalyst in fluidized bed and operating in three-phase fluidization, in which process a coolant is circulated in at least one heat-exchange zone (2) internal to the reaction zone and immersed within said fluidized bed, characterized in that the coolant is introduced into the heat-exchange zone (2) at a temperature close to its boiling point at the pressure of the reaction medium, this boiling point moreover being situated in a range of 10 to 70°C below the temperature of the reaction medium, and preferably in a range of 15 to 60°C below the temperature of the reaction medium.

2 - Process for hydrocarbons synthesis according to claim 1 wherein the pressure of the reaction medium is between 20 and 60 bar, preferably between 30 and 50 bar, and the temperature of the reaction medium is between 200 and 250°C, and preferably between 220 and 240°C.

3 - Process for hydrocarbons synthesis according to one of claims 1 to 2 wherein the coolant used in the heat-exchange zone (2) is chosen from among the following compounds: methanol, ethanol or any mixture of these compounds.

4 - Process for hydrocarbons synthesis according to one of claims 1 to 3 wherein the coolant used in the heat-exchange zone (2) also comprises water in a proportion of less than 85% by weight of the mixture constituting the said coolant, and preferably in a proportion of less than 70% of the said mixture.

5 - Process for hydrocarbons synthesis according to one of claims 1 to 4 wherein the heat-exchange zone (2) is constituted by an immersed exchanger comprising a tube bundle of which the exchange surface density, that is to say the exchange surface per m<sup>3</sup> of reactor volume, is between 10 and 30 m<sup>2</sup>/m<sup>3</sup>, and preferably between 15 and 25 m<sup>2</sup>/m<sup>3</sup>.

6 - Process for hydrocarbons synthesis according to one of claims 1 to 5, wherein the coolant introduced at least in part in the liquid state into the heat-exchange zone (2) is

partially vaporized in the said zone, is condensed at least in part in at least one condensation zone (8), the liquid phase resulting from the said condensation being recycled at least in part into the heat-exchange zone (2).

5 7 - Process according to claim 6 wherein the condensation zone (8) comprises a liquid/vapour separation zone (5), the partially vaporized coolant is passed into the separation zone (5), a gas phase (6) is recovered which is condensed in the condensation zone (8), and a liquid phase (7) which is recycled with the liquid phase originating in the zone (8) into the heat-exchange zone (2).

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8 - Process according to one of claims 6 to 7 wherein the coolant-condensing zone (8) comprises a tube bundle using water as coolant, a vapour phase of which, extracted at the top of the said tube bundle, is condensed in a separation zone (13) situated above the condensation zone (8), and a liquid phase of which is drawn off from the  
15 separation zone (13) and recycled into the tube bundle of the condensation zone (8).

9 - Process according to one of claims 6 to 8 wherein a vapour phase of the coolant is recovered at the top of the condensation zone (8), which is expanded in at least one turbine (24), the thus-expanded liquid/vapour mixture is cooled and condensed, the  
20 liquid phase of the thus-obtained coolant is separated, and it is recycled into the condensation zone (8).

10 - Process according to one of claims 1 to 9 wherein the temperature of the reaction medium is controlled by means of a dynamic control system acting on the pressure or  
25 on the flow rate of the coolant, so as to remain on the chosen operating point, even if this is unstable.